

Day : Saturday
Date : 28/10/2017

Time : 12.00 NOON TO 02.00 PM
Max. Marks : 40

W-2017-0616

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw diagrams **WHEREVER** necessary.
- 4) Use of scientific **CALCULATOR** is allowed.

Q.1 Answer **ANY TWO** of the following: [10]

- a) What is a laser? Explain the principle of laser. Also state its two applications.
- b) Two thin covering lenses of focal lengths 15 cm and 20 cm are co-axially 10cm apart. An object is placed at a distance of 15cm from the first lens. Find:
 - i) The position of focal points.
 - ii) The position of principle points.
 - iii) The position of the image.
- c) Define retardation plate. Explain the theory of quarter wave plate and half wave plate.

Q.2 Answer **ANY TWO** of the following: [10]

- a) Derive lens maker's formula for a thin lens.
- b) State five points of difference between Ramsden's eye piece and Huygen's eye piece.
- c) Obtain the condition $2\mu t \cos r = m \lambda$ for destructive interference in the reflected system of rays from a parallel sided thin film.

Q.3 Answer **ANY TWO** of the following: [10]

- a) State Brewster's law and explain how it can be used to produce the plane polarized light.
- b) The focal length of each lens of Ramsden's eye-piece is 4cm. Calculate the focal length of eye-piece and locate the positions of cardinal points.
- c) What is a zone plate? Derive an expression for its focal length.

Q.4 Answer **ANY FIVE** of the following: [10]

- a) Calculate the focal length of a double convex lens for which the radius of curvature of each surface is 25cm and refractive index of the material of the lens is 1.5.
- b) Define magnifying power of a compound microscope.
- c) Give two points of difference between interference and diffraction.
- d) Define the following: **i)** Diffraction grating **ii)** Resolving power
- e) In Newton's ring experiment, the diameter of the 10th dark ring is found to be 4mm. The radius of curvature of the plano-convex lens is 100cm. Assuming the intervening medium to be air, calculate the wavelength of light.
- f) Give two points of difference between positive crystal and negative crystal.
- g) A plane wave of wavelength 5000\AA is incident on a circular aperture of radius 0.4mm. Calculate the position of the brightest point on the axis.